Claims

What is claimed is:

1. A solenoid carrier assembly comprising:

a carrier with a top surface separated from a bottom surface by a side surface;

a stator assembly attached to said carrier and including an exposed bottom surface; and

a deflection cavity disposed in said carrier between said top surface and said stator assembly.

2. The carrier assembly of claim 1 wherein said bottom surface of said stator assembly is flush with said bottom surface of said carrier.

3. The carrier assembly of claim 1 including a first fluid passage disposed in said carrier and extending between said top surface and said bottom surface; and

a second fluid passage disposed in said carrier and extending between said top surface and said side surface.

4. The carrier of claim 3 wherein a portion of said second passage is defined by an annular valve seat;

said side surface includes a pair of annular ridges; and

said second passage opens through said side surface between said pair of annular ridges.

5. The carrier assembly of claim 1 wherein said top surface includes a planar portion oriented parallel to a planar portion of said bottom surface of said carrier.

6. The carrier assembly of claim 1 wherein said stator assembly includes at least one of a female electrical connector and a male electrical connector exposed through said top surface of said carrier.

7. The carrier assembly of claim 1 wherein said stator assembly includes a top surface with at least one peripheral raised portion in contact with said carrier; and

said deflection cavity being at least partially surrounded by said raised portion.

8. The carrier assembly of claim 7 wherein said raised portion is at least a portion of a circle.

9. A fuel injector comprising:

a plurality of stacked components, which include a solenoid carrier assembly positioned between a barrel and a needle valve;

said solenoid carrier assembly including a deflection cavity disposed in said solenoid carrier assembly between a top surface and a stator assembly; and

said deflection cavity being located underneath a plunger bore disposed in said barrel.

10. The fuel injector of claim 9 including a pressure intensifying pumping element slideably received in said plunger bore.

11. The fuel injector of claim 9 wherein said stator assembly is a portion of a solenoid operably coupled to a control valve, which is located between said solenoid carrier and said needle valve.

12. The fuel injector of claim 11 wherein said needle valve is a direct control needle valve that includes a closing hydraulic surface exposed to fluid pressure in a needle control chamber; and

said control valve has a first position in which said needle control chamber is fluidly connected to a low pressure passage; and a second position in which said needle control chamber is blocked to said low pressure passage.

13. The fuel injector of claim 12 wherein said needle control chamber is blocked to a nozzle supply passage when said control valve is in said first position, and fluidly connected to said nozzle supply passage when said control valve is in said second position.

14. The fuel injector of claim 9 wherein said solenoid carrier assembly includes a carrier; and

said plurality of stacked components includes an air gap spacer in contact with said carrier and said stator assembly.

15. The fuel injector of claim 9 including a nozzle supply passage disposed in said solenoid carrier assembly and extending between said top surface and a bottom surface; and

a fuel supply passage disposed in said solenoid carrier assembly and extending between said top surface and a side surface.

16. The fuel injector of claim 15 wherein a portion of said fuel supply passage is defined by an annular valve seat; and including

an edge filter that includes a clearance area between said side surface and a casing component.

17. The fuel injector of claim 9 wherein said stator assembly includes at least one of a female electrical connector and a male electrical connector exposed through said top surface of said solenoid carrier assembly.

18. The fuel injector of claim 17 including an electrical extension with one end exposed adjacent a top of said barrel, a central portion extending through said barrel, and an other end mated to said electrical connector of said stator assembly.

19. The fuel injector of claim 9 wherein said solenoid carrier assembly includes said stator assembly and a carrier;

said stator assembly includes a top surface with at least one peripheral raised portion in contact with said carrier; and

said deflection cavity being at least partially surrounded by said raised portion.

20. A method of desensitizing armature air gap to component distortion in a fuel injector, comprising the steps of:

assembling a stator assembly to a carrier having a distortion region;

separating the distortion region from a portion of a top surface of the stator assembly with a deflection cavity; and

making a bottom surface of the carrier and a bottom surface of the stator assembly flush.

21. The method of claim 20 wherein said separating step includes the steps of:

forming at least one peripheral raised portion on the top surface of the stator assembly; and

positioning the raised portion in contact with the carrier.

22. The method of claim 21 including a step of positioning an air gap spacer in contact with said bottom surface of said carrier and said bottom surface of said stator assembly.

23. A carrier assembly comprising:

a carrier including a ball valve seat;

a stator assembly attached to said carrier.

24. The carrier assembly of claim 23 wherein said ball valve seat is a portion of a fluid passage and is located a predetermined distance away from a top surface of said carrier.

25. The carrier assembly of claim 23 including a ball valve member movably positioned in said carrier adjacent said ball valve seat; and

said carrier defining a portion of a nozzle supply passage extending between a top surface and a bottom surface of said carrier.